**Measuring the Bike-Accessibility of Community Trees and Gardens in Vancouver Using QGIS**

Introduction to QGIS

Facilitator: Matthew McKitrick

*For optimal viewing in Microsoft Word, use ‘Web Layout’ by going* ***View > Web Layout***

**Step 1: Gather Data**

1. Download the following files from Vancouver open data: <https://opendata.vancouver.ca/explore>
   1. Vancouver city boundary (.shp File)
      1. *Search for ‘City Boundary’. Filename: ‘city-boundary’*
      2. **Make sure you set the export CRS to EPSG 26910 before exporting for each file.**
         1. A screenshot of a cell phone

            Description automatically generated
   2. Vancouver bikeways (.shp File)
      1. *Search ‘bikeways’*
   3. Community Gardens and Fruit Trees (.shp File)
      1. Search ‘gardens’
   4. Move file folders to an accessible folder location, such as your home directory, project folder, or on your desktop.

**Step 2: Add files to QGIS**

1. Set data folder as favourite in QGIS
   1. Use the browser on the left to navigate and select the folder that contains your data and set it as a favorite so that it is easy to find.
   2. A screenshot of a cell phone

      Description automatically generated
2. Drag and drop the files from the folder into the map area
   1. For shapefiles, be sure to open the folders and drag only the .shp files into QGIS, leaving the other files in place.
   2. Verify that your CRS is consistent between each layer and the project before moving on.
   3. If the CRS is not consistent, or some of your shapefiles are set to EPSG 4326, you may need to redownload the files as EPSG 26910.

**Step 3: Garden Layer Buffer**

1. Create a 250-meter buffer around each community garden/tree in the layer.
   1. Vector > Geoprocessing > Buffer
      1. A screenshot of a cell phone

         Description automatically generated
      2. Buffer distance = 250m
         1. \*\*\*\* If distance is in decimal degrees, you are not in a projected CRS.
      3. A screenshot of a cell phone

         Description automatically generated
2. Now we have a layer that has spatial values for a 250m ring around each tree and garden.
   1. We can use this layer to assess how many trees/gardens are more than 250m away from a bikeway, and therefore are ‘inaccessible’

**Step 4: Select Inaccessible Locations**

1. Select all buffers that *don’t* intersect with a bikeway
   1. Vector > Research Tools > Select by Location
      1. *Select features from:* **Buffered**
      2. *Where the Features:* **Intersect**
      3. *By comparing features from:* **Bikeways**
   2. A screenshot of a cell phone

      Description automatically generated
   3. Now, right click the attribute table of **‘Buffers’** and click ‘*invert selection’*
      1. This operation deselects all currently selected features, and selects those previously unselected.
2. Select all gardens/trees that are not accessible
   1. Select by location again:
      1. Select Features from: **Trees/gardens layer**
      2. **Intersect**
      3. Compare to: **Buffers**
      4. Select: ‘**Selected features only’**
3. Export inaccessible trees/gardens to a separate file.
   1. Right click layer > Export > Save selected features as
      1. Choose a name ; save in working folder.

**Step 5: Identify Inaccessibility Hotspots**

1. Create a heatmap of hotspots
   1. First, enable the **Layer Styling Panel**
      1. View > Panels > Layer Styling Panel
      2. A screenshot of a video game

         Description automatically generated
   2. Select ‘heat map’ from the Symbology drop-down menu
      1. A screenshot of a video game

         Description automatically generated
   3. Define the *Radius* for your layer
      1. The radius is defined as the maximum distance between two points for them to be blended together on the heatmap.
         1. Select *Map Units* and give a reasonable value, say 250m.
   4. Now you have a heatmap showing densities of bike-inaccessible trees and gardens
      1. But, the heatmap in is obscuring the rest of your map!
   5. At the bottom of the layer styling panel, open the ‘*Layer Rendering’* tab.
      1. Experiment with different levels of layer opacity.
      2. Experiment with Blending Modes

**Step 6: Prepare and Export Your Map**

1. Create a new **map layout** by opening the layout manager
   1. Project > Layout Manager
   2. A screenshot of a computer

      Description automatically generated
   3. Select ‘*Create’* and enter a name for your map layout.
2. Design your layout
   1. Use the  icon to add your map to the layout
      1. This tool adds the current extent in your **Project View** to a user-drawn area in the current **Map Layout View.**
   2. Now, there are a few things you need to add to make your map *Cartographically Correct*
      1. Add a north arrow using the  tool
      2. Add a legend using the  tool
         1. Adjust the item text and remove unneeded items using the  and  buttons.
         2. Uncheck ‘Auto Update’ if the options are greyed out. Auto-update ensures that the layers present in the project view will be present in the layout view.
      3. Add a title using the  button.
      4. Add a scale bar using the  button.
   3. Export your map.
      1. Select your desired export format from the top toolbar in the map layout view.
         1.  (Image, SVG File, PDF File).
            1. **.PNG** Images are usually an appropriate map export format.
      2. Give your map a name and save it in an accessible location.
         1. Set desired image resolution and size
3. **Locate the file and view your map. You’re done!**